IN THE UNITED STATES DISTRICT COURT
FOR THE MIDDLE DISTRICT OF PENNSYLVANIA

UNITED STATES OF AMERICA	:	**CRIMINAL NO. 1:16-CR-212**
	:	
v.	:	**(Judge Conner)**
	:	
TOREY WHITE,	:	
	:	
Defendant	:	

MEMORANDUM

Defendant Torey White moves the court pursuant to Federal Rule of Evidence 702 and Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993), and its progeny, to bar the government from introducing at trial cell site coverage maps generated using the ZetX Trax Investigative Suite as well as expert testimony founded on those maps. For the reasons set forth herein, the court will deny White's motion.

I. Background

The criminal investigation and charges in this case originate with a triple homicide and robbery on June 25, 2016. The third superseding indictment identifies the homicide victims as Wendy Chaney, Phillip Jackson, and Brandon Cole. Chaney was the target of the murders; several of the codefendants in this case learned she was cooperating with law enforcement regarding their drug-trafficking activities and decided to have her killed. The murders and robbery occurred in a barn on Jackson's farm, located at 11026 Welsh Run Road in Mercersburg, Franklin

County, Pennsylvania.[1] Charging documents allege, and codefendant Michael Buck has since testified, it was White who lured Chaney to Jackson's farm on the night of the murders. (See Doc. 499 ¶ 12; Doc. 1361, 4/14/22 Coles Trial Tr. 162:13-15, 181:20-25).

White intends to present an alibi defense at trial to establish he was not present at a "rendezvous" meeting at Buck's house during which coconspirators planned the murders and White purportedly assured the group Chaney would be at the farm. (See Doc. 1090). White's whereabouts on the evening of June 25, 2016, are thus a central and hotly disputed question. To establish White's location, the government intends to offer, *inter alia*, two expert witnesses (Judy Fernandez of LexisNexis Special Services, Inc., and Lieutenant Matthew Bonin of Pennsylvania State Police) who will testify to using the ZetX Trax Investigative Suite ("Trax") to generate cell site coverage maps utilizing call detail records ("CDRs") obtained from cell phones of various individuals involved in this case.

[1] The alleged events leading up to, and on the night of, the triple homicide and robbery have been detailed in the court's numerous prior opinions in this case, familiarity with which is presumed.

On April 17, 2023, White's counsel filed the instant motion (Doc. 1642) to exclude the Trax maps at trial, as well as Fernandez's and Bonin's expert testimony relying on those maps, as unreliable.[2] With an impending trial date of May 1, the court expedited proceedings on the motion, and yesterday convened an evidentiary hearing during which we heard testimony from Sy Ray, former law enforcement officer and developer of Trax; Dr. Vladan M. Jovanovic, an electrical engineer; and R. Clayton Simmonds, a retired supervisory special agent with the FBI's Cellular Analysis Survey Team (also known as CAST).

The record developed during the evidentiary hearing established Trax is a cell site coverage mapping software that utilizes CDRs to determine which cell sector serviced a given device at a given time; it then applies an algorithm to draw an antenna radiation pattern or horizontal plane outward from that cell sector to establish the area in which Trax estimates the cell phone *likely* was located at the

[2] The defense motion underlying this memorandum arguably is untimely. Our pretrial scheduling order set a deadline of September 20, 2021, for Daubert motions. (See Doc. 921). The defense had notice since September 10, 2021, that the government intended to offer a witness from ZetX as an expert in the field of digital forensic evaluations. (See Doc. 976). And it was aware since February 2022—when the government noticed Lieutenant Bonin as an expert on the subject in response to White's notice of alibi defense, (see Doc. 1128)—that Bonin had utilized, and his opinions would be based on maps generated by, Trax. The defense maintains a recent shift in the government's theory of White's movements on June 25, 2016, animated the instant motion; we entertained the eleventh-hour filing, despite its patent untimeliness, in deference to the defendant. The expedited nature of the proceedings, however, has precluded the court from obtaining an official transcript of yesterday's four-and-one-half-hour hearing prior to publication of this opinion. Our findings herein are premised on our recollection of the witness testimony and rest largely upon credibility determinations and uncontested facts.

time of the connection.[3] Ray explained the rounded shape Trax uses for cell coverage mapping—which the parties and Ray have referred to variously as a horizontal plane, an antenna radiation pattern, and even an "amoeba" or "blob"[4]—has its origins in radiofrequency horizontal planing techniques dating to the 1930s. Ray testified the horizontal plane utilized by Trax reflects the radiation pattern produced from an antenna measured in an anechoic chamber (essentially, an interference-free room in which the antenna is rotated 360 degrees and energy emitted by the antenna is measured and mapped). Trax then superimposes that pattern around a cell sector to map an approximate coverage area. The size of the plane—how far it extends in a given direction—is then adjusted up or down based on cell tower density, pursuant to an algorithm developed through drive testing.[5]

Ray testified he created Trax after becoming increasingly frustrated with the limitations of the alternative model advocated by White, which produces a conical open wedge or pie shape originating at the cell tower in the direction the antenna was oriented at the time of the relevant connection. Ray explained a cell tower

[3] We emphasize "likely" because Ray explained candidly that, due to the number of variables at play when a cell phone determines which tower to use, it is impossible to say with absolute precision, based on CDRs alone, where exactly a cell phone was located at a given time.

[4] For consistency, we refer to the shape as the "horizontal plane" or "plane."

[5] Drive testing is a widely accepted method of collecting field measurements of a cell sector's coverage area. As the name suggests, a drive test is conducted by driving a motor vehicle equipped with a radiofrequency scanner along a particular geographical route, collecting samples of the cell tower's signal and geotagging the location where the sample was collected. Ray testified that, since 2009, ZetX has conducted "millions" of drive tests on cell sites to develop its database and improve its algorithms.

typically has three cell sectors, and the angle of each wedge for a typical tower is 120 degrees. Ray testified his extensive field experience in mapping CDRs revealed that the open wedge, while representing the "optimal" coverage area, failed to account for actualities such as cell tower density and coverage overlap. The result of this deficiency is that the open wedge fails to capture probable coverage in what Ray referred to as sidelobes and rearlobes of a cell sector—areas just outside of and behind the particular wedge's outer 120-degree boundary where drive tests confirmed cell signals actually were picked up by the adjacent sector. The horizontal plane utilized by Trax accounts for this problem by extending the coverage area slightly further backward and sideways from the wedge.[6]

II. Legal Standard

Admissibility of expert testimony is governed by Federal Rule of Evidence 702. See FED. R. EVID. 702; see also Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 588-89 (1993). Trial courts must act as gatekeepers to "ensure that any and all scientific testimony or evidence admitted is . . . reliable." See Daubert, 509 U.S. at 589. Rule 702 provides:

> A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if: (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue; (b) the testimony is based on sufficient facts or data; (c) the testimony is the product of reliable principles and methods; and (d) the expert has

[6] Simmonds agreed there is "always" going to be some "backload" or "sideload" falling outside of the wedge shape; he contended only that based on his experience with drive tests, those overlap areas are smaller than what is displayed by Trax.

> reliably applied the principles and methods to the facts of the case.

FED. R. EVID. 702. The Third Circuit Court of Appeals has explained that "Rule 702 embodies a trilogy of restrictions on expert testimony: qualification, reliability and fit." See Schneider *ex rel.* Estate of Schneider v. Fried, 320 F.3d 396, 404 (3d Cir. 2003) (citation omitted). The rule embraces a "liberal policy of admissibility," under which it is preferable to admit any evidence that might assist the trier of fact. See Pineda v. Ford Motor Co., 520 F.3d 237, 243 (3d Cir. 2008) (quoting Kannankeril v. Terminix Int'l, Inc., 128 F.3d 802, 806 (3d Cir. 1997)).

III. Discussion

A. Qualification

We turn first to the largely uncontested element of qualification. An expert witness must be qualified to testify as such by possessing "specialized expertise." See Schneider, 320 F.3d at 404. Requisite expertise can include "a broad range of knowledge, skills, and training." See id. (quoting *In re* Paoli R.R. Yard PCB Litig., 35 F.3d 717, 741 (3d Cir. 1994)). Such expertise can be "practical," too; it need not be "academic." See Elcock v. Kmart Corp., 233 F.3d 734, 741 (3d Cir. 2000) (citation omitted). Our court of appeals has emphasized that this first requirement should be interpreted "liberally," and permits "generalized qualifications" rather than "overly rigorous requirements of expertise." See *In re* Paoli, 35 F.3d at 741.

The government has established Ray is qualified to offer expert testimony on the subject of radiofrequency geolocation analysis of mobile devices and, based on his expertise in that area, the reliability of Trax's methodologies. Ray has extensive

law enforcement experience, including decades of field experience reviewing and analyzing CDRs, estimating locations of cell phones based on those CDRs, testing various mapping options, and ultimately developing software to create an alternate visualization of a cell phone's approximate location. That Ray is not an engineer or academic is of no moment; he has precisely the type of "practical" experience that has allowed him to develop "specialized expertise" in this field. See Elcock, 233 F.3d at 741 (citation omitted); Schneider, 320 F.3d at 404.

B. Reliability

White focuses the bulk of his arguments on the reliability prong. Expert testimony is "reliable" if it is based upon sound methodology and technique. See *In re* Paoli, 35 F.3d at 742. The touchstone is whether the expert's methodology is "sufficiently reliable so that it will aid the jury in reaching accurate results." See id. at 744 (internal quotation marks omitted). An expert opinion cannot be based on "subjective belief and unsupported speculation." See UGI Sunbury LLC v. A Permanent Easement for 1.7575 Acres, 949 F.3d 825, 834 (3d Cir. 2020). However, "[t]he evidentiary requirement of reliability is lower than the merits standard of correctness." See *In re* Paoli, 35 F.3d at 744. Our court of appeals has explained that "[a]s long as an expert's scientific testimony rests upon 'good grounds, based on what is known,'" it should be admitted. See United States v. Mitchell, 365 F.3d 215, 244 (3d Cir. 2004) (citation omitted); see also Kannankeril, 128 F.3d at 806 ("Admissibility decisions focus on the expert's methods and reasoning; credibility decisions arise after admissibility has been determined.").

The Third Circuit has enumerated several factors to guide the court's reliability inquiry:

> (1) whether a method consists of a testable hypothesis; (2) whether the method has been subject to peer review; (3) the known or potential rate of error; (4) the existence and maintenance of standards controlling the technique's operation; (5) whether the method is generally accepted; (6) the relationship of the technique to methods which have been established to be reliable; (7) the qualifications of the expert witness testifying based on the methodology; and (8) the non-judicial uses to which the method has been put.

Pineda, 520 F.3d at 247-48 (citing *In re* Paoli, 35 F.3d at 742 n.8). This list of factors is a "convenient starting point," but is "neither exhaustive nor applicable in every case." See Kannankeril, 128 F.3d at 806-07. The United States Supreme Court has emphasized that "relevant reliability concerns may focus upon personal knowledge or experience." See Kumho Tire Co. v. Carmichael, 526 U.S. 137, 150 (1999). The Rule 702 inquiry therefore is "a flexible one," and the factors considered must be applicable to the facts of the case. See id. (quoting Daubert, 509 U.S. at 594).

The parties have offered compelling arguments regarding the respective strengths and weaknesses of Trax's methodology. Nonetheless, based on the record developed during the evidentiary hearing, most of the salient factors, to varying degrees, favor admitting the Trax maps and testimony relying on those maps. Trax's methodology is testable, and Trax has been tested by (and has seen its algorithm updated as a result of) millions of drive tests by both Trax itself and by its end users, which one defense expert agreed is "the gold standard" for testing accuracy of cell site coverage areas. Trax has a 94 to 96 percent accuracy rate or,

inversely, a 4 to 6 percent error rate. Ray explained Trax's error rate is even lower in rural areas (like many of the areas at issue *sub judice*) due to lower cell tower density. The scientific foundation on which Trax's methodology primarily rests, namely, radiofrequency horizontal planing and CDRs, is not novel and is generally accepted, and Ray testified Trax itself is widely used by approximately 700 law enforcement agencies.

That Trax's methodology has not been peer reviewed and that it lacks nonjudicial uses (save for criminal investigations) are valid concerns which were properly raised by defense counsel. Those concerns, however, do not outweigh the factors favoring admissibility. Moreover, neither defense expert offered persuasive testimony explaining precisely why they disapprove of Trax's horizontal plane, or why they believe the open wedge is a better or more accurate model.[7] Nor did they offer a competing accuracy or error rate for Trax or for their preferred open-wedge model, or meaningfully explain why, based on data or other grounds, they believe an open-wedge model can more reliably capture a cell sector's actual coverage area.[8]

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[7] Both defense experts' video testimony was hard to parse due largely to interruptions in testimony and technical difficulties on the experts' end. Dr. Jovanovic's testimony was difficult to understand because of a language barrier, and ultimately his testimony was cut short because his apparently perplexed mother could not be dissuaded from communicating with him via Skype while he was in the midst of testifying. Many of Simmonds' responses were unclear because his microphone cut in and out during the course of his testimony.

[8] Simmonds actually aligned with Ray on key points such as the importance of drive testing (agreeing it is the "gold standard" for testing cell coverage areas) and that neither of the competing methodologies (Trax's horizontal plane or the alternative open wedge) is perfect; both produce estimations or, as Simmonds phrased it, a "general idea" of the actual coverage footprint.

Ray, for his part, was knowledgeable and compelling, and we find his testimony highly credible. Ray grounded Trax's methodology in a marriage of generally accepted scientific principles and practical experience, he explained perceived flaws in open-wedge maps, and he was candid about the reciprocal limitations (namely, potential overestimation of true coverage areas) with Trax's maps. Ray also offered helpful illustrations establishing Trax's accuracy within the parameters of this case. For example, he used precision GPS location information from Chaney's cell phone to test the accuracy of the coverage map Trax generated using the phone's CDRs, and the overlay established Chaney's phone was outside of Trax's horizontal plane less than one quarter of one percent of the time—just 5 times out of more than 2,300 CDRs. In other words, Trax's accuracy rate in this case was greater than 99.9 percent. The open-wedge model overlaid against those same GPS records produced an error rate of 10 percent and often failed to accurately capture the true location of Chaney's phone.[9]

For all of these reasons, we conclude the government has established Trax's methodology rests on sufficiently "good grounds" to permit use of Trax-generated maps at trial, see Mitchell, 365 F.3d at 244 (quoting Daubert, 509 U.S. at 590); see also *In re* Paoli, 35 F.3d at 744 (noting "grounds for the expert's opinion merely have to be good, they do not have to be perfect"), as well as expert testimony regarding those maps. The parties' dispute essentially boils down to a battle of experts over whether the better approach is to potentially overestimate the size of a cell site

[9] The government's Exhibit 12 admitted during the hearing depicts one example of this; GPS records confirmed that Chaney's phone was located outside of the open wedge but well within the horizontal plane's sidelobe.

coverage area (which is what White says Trax does) or to potentially underestimate it (which is what Ray says the open wedge does). That dispute is appropriately put to the jury, which can assess the witnesses' credibility and make its own findings after hearing the relative strengths and weaknesses of each method and weighing all other evidence adduced in the case. Cf. United States v. Reynolds, No. 1:20-CR-24, 2021 WL 3750156, at *5 (W.D. Mich. Aug. 25, 2021) (noting admissibility of Trax is "close call" given lack of peer review and meaningful data on error rate, but defendant's arguments challenging Trax's methodology were matters to be explored on cross-examination and through competing expert testimony).[10]

C. Fit

Expert testimony meets the final requirement under Rule 702 when it is "'sufficiently tied to the facts of the case,' so that it 'fits' the dispute and will assist the trier of fact." See UGI Sunbury LLC, 949 F.3d at 832 (quoting Daubert, 509 U.S. at 591). White's whereabouts on the night of June 25, 2016, the night of the murders charged in the third superseding indictment, are contested, and White intends to raise an alibi defense which puts his location squarely in issue. Expert testimony on the subject of cell site mapping and cell phone geolocation fits the facts of this case, and will assist the jury in resolving that factual dispute.

[10] Our ruling is premised on our understanding and expectation that expert testimony presented by either party on the subject of cell site coverage mapping will be accompanied by the explicit caveats regarding both methods' limitations provided by the parties' experts during the evidentiary hearing.

IV. Conclusion

The court will deny White's motion to exclude unreliable scientific testimony.

An appropriate order shall issue.

/S/ CHRISTOPHER C. CONNER
Christopher C. Conner
United States District Judge
Middle District of Pennsylvania

Dated: April 27, 2023